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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/792,108

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Bruce E. Kreischer

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EXAMINER

BOYER, RANDY

ART UNIT

PAPER NUMBER

1764

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/26/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

**Application No.**

10/792,108

**Applicant(s)**

KREISCHER, BRUCE E.

**Examiner**

Randy Boyer

**Art Unit**

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date See Continuation Sheet.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :10 January 2005, 14 January 2005, 14 November 2005.

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 5 is objected to for use of relative terminology that renders the claim unclear.
2. Claim 5, as submitted, discloses the use of a solvent "having from about 3 to 9 carbon atoms." However, Applicant's specification does not teach the use of any solvent having less than 3 or more than 9 carbon atoms. In such case, the relative term "about" renders the claim unclear, as it does not apprise the person having ordinary skill in the art with the intended scope of the subject matter that Applicant claims as his own. Examiner suggests correction by striking the word "about" from the claim. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-8, and 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Dixon (WO 03/053890 A1).
5. With respect to claim 1, Dixon discloses a method of separating an oligomerization reactor effluent (page 12, lines 21-24, and page 14, lines 13-18), comprising: (a) separating the oligomerization reactor effluent into a liquid portion and a vapor portion (page 15, lines 20-27, and Figure 2); (b) distilling the portions of the oligomerization reactor effluent (page 15, lines 27-31, and Figure 2); and (c) recovering an oligomerization product stream (page 16, line 7, and Figure 2).
6. With respect to claim 2, Dixon discloses wherein the oligomerization reactor effluent is from a trimerization reactor (page 3, lines 12-15).
7. With respect to claim 3, Dixon discloses wherein the oligomerization reactor effluent is from trimerization of ethylene to 1-hexene (Example 6).
8. With respect to claims 4-7, Dixon discloses wherein the solvent comprises cyclohexane (Example 6 and Table 2).
9. With respect to claim 8, Dixon discloses wherein the oligomerization reactor effluent comprises a catalyst system (page 15, lines 3-6).
10. With respect to claim 35, Dixon discloses an oligomerization product (page 15, lines 8-31, and page 16, lines 1-7) made by the method of (a) separating the oligomerization reactor effluent into a liquid portion and a vapor portion (page 15, lines 20-27, and Figure 2); (b) distilling the portions of the oligomerization reactor effluent (page 15, lines 27-31, and Figure 2); and (c) recovering an oligomerization product stream (page 16, line 7, and Figure 2).

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11. Claims 9-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Woodard (WO 99/19280).

12. With respect to claim 9, Woodard discloses a method of separating a trimerization reactor effluent, comprising: (a) separating the trimerization reactor effluent into a liquid portion and a vapor portion (page 1, lines 17-18); (b) distilling the portions of the trimerization reactor effluent (page 1, lines 17-18); and (c) recovering a trimerization product stream (Figure 1); wherein the trimerization reactor effluent comprises cyclohexane (page 10, lines 28-30, and page 12, line 27), and a catalyst system composed of a chromium source (page 2, lines 23-24), a pyrrole-containing compound (page 2, lines 23-24), a methyl alkyl (page 5, lines 5-7), and a halide source (page 6, line 27).

13. With respect to claim 10, Woodard discloses a method of separating an oligomerization reactor effluent, further comprising killing the catalyst system prior to distilling the portions of the oligomerization reactor effluent (Figure 1).

14. With respect to claims 11-13, Woodard discloses wherein the catalyst system is killed with an alcohol (page 15, lines 28-30).

### ***Claim Rejections - 35 USC § 103***

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which

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said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art;
2. Ascertaining the differences between the prior art and the claims at issue;
3. Resolving the level of ordinary skill in the pertinent art;
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

17. Claims 14-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dixon (WO 03/053890 A1) in view of Seader et al., *Perry's Chemical Engineers' Handbook*, 7th ed. New York, McGraw Hill, 1997, pp. 13-4 – 13-9.

18. With respect to claim 14, Dixon discloses a method of separating an oligomerization reactor effluent (see Dixon, page 12, lines 21-24, and page 14, lines 13-18), comprising: (a) separating the oligomerization reactor effluent into a liquid portion and a vapor portion (see Dixon, page 15, lines 20-27, and Figure 2); (b) distilling the portions of the oligomerization reactor effluent (see Dixon, page 15, lines 27-31, and Figure 2); and (c) recovering an oligomerization product stream (see Dixon, page 16, line 7, and Figure 2).

Dixon does not disclose wherein the oligomerization product stream comprises 1-hexene and solvent.

However, Seader discloses a thermally coupled separation system for the separation of a ternary stream in which a first separator is used to separate the majority of light components into the vapor phase and heavy components into the liquid phase

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(see Seader, page 13-5). The vapor and liquid product streams from the first separator are then directed to a second separator (i.e. distillation column) wherein all three products are produced, with the middle product (corresponding to the intermediate boiling species) being taken off as a sidestream whose outlet is located at a point between the vapor feed inlet and liquid feed inlet from the first separator (see Seader, page 13-5, and page 13-8, Figure 13-6b). Seader explains that such a separation scheme is particularly useful for reducing energy requirements when the initial feed contains close-boiling species (see Seader, page 13-5). In addition, Seader discloses use of a single-stage flash (e.g. for use as a first separator in the separation scheme) where the relative volatility between two components to be separated is relatively large, or only a partial separation is to be made (see Seader, page 13-6, and page 13-9, Figure 13-7a).

Therefore, it would have been obvious to the person having ordinary skill in the art at the time the invention was made to modify the process of Dixon to provide for greater process efficiency and improved economics by including a step of flash vaporization of the reactor effluent prior to complete separation of the effluent stream into three individual process streams of (a) a lights stream comprised primarily of ethylene, (b) a product stream comprised primarily of 1-hexene and solvent, and (c) a heavies stream comprised primarily of solvent and other residual components.

19. With respect to claim 15, Seader discloses the flashing of a multi-component stream (see Seader, page 13-6, and page 13-9, Figure 13-7a).



20. With respect to claim 16, Seader discloses wherein distilling is performed in a common distillation column (see Seader, page 13-8, Figure 13-6b).

21. With respect to claim 17, Seader discloses wherein the liquid portion is fed to the distillation column at a liquid feed inlet on the distillation column and the vapor portion is fed to the distillation column at a vapor feed inlet on the distillation column (see Seader, page 13-8, Figure 13-6b).

22. With respect to claim 18, Seader discloses wherein the product stream is withdrawn from a side draw outlet of the distillation column (see Seader, page 13-8, Figure 13-6b).

23. With respect to claim 19, Seader discloses wherein the side draw outlet is located below the vapor feed inlet and above the liquid feed inlet on the distillation column (see Seader, page 13-8, Figure 13-6b).

24. With respect to claim 20, Seader discloses wherein the distillation column comprises a number of stages between the liquid feed inlet and side draw outlet effective to separate heavies (i.e. bottoms product) from the intermediate product (see Seader, page 13-8, Figure 13-6b).

25. With respect to claim 21, Seader discloses wherein the distillation column comprises a number of stages between the vapor feed inlet and the side draw outlet effective to separate lights (i.e. overhead product) from the intermediate product (see Seader, page 13-8, Figure 13-6b).

26. With respect to claim 22, Dixon discloses separating 1-hexene and cyclohexane from the oligomerization product stream (see Dixon, page 15, lines 20-22).

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27. With respect to claim 23, Dixon discloses wherein the oligomerization reactor effluent having a composition greater than 90% by weight of C<sub>6</sub> components (see Dixon, Table 2).

28. With respect to claim 24, Seader discloses wherein the liquid portion is expected to comprise a portion of the component(s) of intermediate volatility as well as other heavy components (see Seader, page 13-5).

29. With respect to claim 25, Seader discloses wherein the vapor portion is expected to comprise a portion of the component(s) of intermediate volatility as well as other light components (see Seader, page 13-5).

30. With respect to claim 26, Seader discloses wherein the component(s) of intermediate volatility are concentrated in the intermediate product stream (see Seader, page 13-5, and page 13-8, Figure 13-6b).

31. With respect to claim 27, Seader discloses (a) feeding a liquid portion of an effluent stream to a first inlet on a distillation column, (b) feeding a vapor portion of an effluent stream to a second inlet on a distillation column located above the first inlet, and (c) withdrawing a product stream from a side drawn outlet located between the first and second inlets (see Seader, page 13-8, Figure 13-6b).

32. With respect to claim 28, Seader discloses a system for separating an effluent comprising (a) a vapor/liquid separator to flash the effluent into a vapor portion and liquid portion (see Seader, page 13-9, Figure 13-7a); and (b) a distillation column in fluid communication with the vapor/liquid separator, wherein the distillation column has a side draw for withdrawing a product stream and receives as separate feeds the vapor

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portion and the liquid portion from the vapor/liquid separator (see Seader, page 13-8, Figure 13-6b).

33. With respect to claim 29, Seader discloses wherein the liquid portion is fed to the distillation column at a location below the side draw (see Seader, page 13-8, Figure 13-6b).

34. With respect to claim 30, Seader discloses wherein the vapor portion is fed to the distillation column at a location above the side draw (see Seader, page 13-8, Figure 13-6b).

35. With respect to claims 31 and 32, Dixon discloses a trimerization reactor for providing oligomerization reactor effluent, wherein the trimerization reactor is in fluid communication with the vapor/liquid separator, and wherein the second distillation column separates trimerization product from solvent (see Dixon, Figure 2).

36. With respect to claim 33, it is known in the art to use additional distillation columns to further resolve a binary stream.

37. With respect to claim 34, Seader discloses wherein the distillation column has at least 3 off-takes and at least 2 inputs (see Seader, page 13-8, Figure 13-6b).

### ***Conclusion***

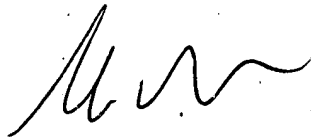
38. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Boyer whose telephone number is (571) 272-7113. The examiner can normally be reached Monday through Friday from 8:00 A.M. to 5:00 P.M.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola, can be reached at (571) 272-1444. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RPB



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